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ABSTRACT

There is growing evidence supporting the powerful role that maternal education plays in child growth and cognitive development in developing countries. This study examined the contribution of maternal literacy in mediating the relationship between maternal education and variation in child outcomes from birth to 7 years of age. It was hypothesized that mothers who had more than 3-4 years of education and a greater probability of being literate would have offspring with reduced incidence of illness, improved growth, and improved performance on cognitive tests. The sample consisted of 266 children and their mothers drawn from four rural communities in eastern Guatemala. Findings indicated that after controlling for socioeconomic status, maternal literacy significantly mediated the relationship between maternal education and respiratory illness in offspring at 4 years of age. Maternal literacy also significantly mediated the relationship between maternal education and cognitive tests at 5 and 6 years of age. (Author/KB)

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THE ROLE OF MATERNAL LITERACY IN CHILD HEALTH AND COGNITIVE DEVELOPMENT IN RURAL GUATEMALA

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ABSTRACT

The purpose of this study was to examine the contribution of maternal literacy in mediating the relationship between maternal education and variation in child outcomes from birth to seven years of age. It was hypothesized that mothers who had more than 3-4 years of education and a greater probability of being literate, would have offspring with reduced incidence of illness, improved growth, and improved performance on cognitive tests.

The sample for this study consisted of 266 children and their mothers drawn from four rural communities in eastern Guatemala. Results from this study indicate that after controlling for socio-economic status, maternal literacy significantly mediated the relationship between maternal education and respiratory illness in offspring at 4 years of age. Maternal literacy also significantly mediated the relationship between maternal education and cognitive tests at 5 and 6years of age. The data present support for sustained investment in basic primary education for females in lower income countries.

INTRODUCTION

There is growing evidence of the powerful role that maternal education plays in child growth and cognitive development in developing countries. The research literature has consistently reported an association between higher years of schooling in the mother and lower incidence of illnesses, higher rates of immunizations, improved nutritional status and improved scores on cognitive tests in offspring independent of culture and socioeconomic status (Cochrane, O' Hara, & Leslie, 1982; Behrman & Wolfe, 1987; Streatfield, Singarimbum & Diamond, 1990; Levine et al, 1991;).

The relationship between more educated mothers and positive outcomes in offspring has been demonstrated to operate through several pathways. More educated mothers often are less fatalistic, are more active in implementing good health practices and have greater access to information. They also have a greater voice in family health decisions, have greater control over resources and are more confident in obtaining services (Levine, 1991; Jejeebhoy, 1995).

The greatest benefits of maternal education have been observed in mothers with 3 or more years of education (Jejeebhoy, 1995). It is possible that schooling imparts a special skill like literacy that enables the schooled mother to better interact with the changing world around her to maximize child outcomes. In rural Guatemala, the probability of being literate was found to increase with each grade completed and reached over 90% with the successful completion of third grade. Literacy skills were also found to increase rather than decline with the passage of time after leaving school (Gorman & Pollitt, 1994). Understanding the role of maternal literacy in child health therefore has tremendous potential as a public health intervention.

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birth to seven years of age. It was hypothesized that mothers who had more than 3-4 years of education and a greater probability of being literate, would have offspring with reduced incidence of illness, improved growth, and improved performance on cognitive tests.

METHODS

Subjects

The sample for this study consisted of 266 children and their mothers who were participants in a longitudinal nutritional supplementation study conducted by the Institute of Nutrition Central America and Panama. This supplementation study was conducted between 1969 and 1977 in four Spanish speaking villages in rural eastern Guatemala (Pollitt, Gorman, Engle, Martorell & Rivera, 1993).

Subjects of the original study included all children seven years or younger living in these villages, those who moved in, and those born, during the duration of the study. The sample for the analysis reported here, was restricted to children with complete data on mother's schooling, maternal literacy, respiratory illness, cognitive performance and socioeconomic status.

Villages

The four villages from which this sample is drawn, had populations ranging from 800 to 1200 inhabitants and were located in a dry mountainous area northeast of Guatemala city. Agriculture was the major occupation in these villages where poverty and illiteracy were common and malnutrition was endemic. Median family income when the study began was $200 (+/- $ 50). Percentage of literacy for mothers in the four villages ranged from 25 to 40% and for fathers' literacy ranged from 38 to 60%. In 1967, less than 10% of the families had any source of water at their homes and no homes were equipped with electricity (Pollitt et al, 1993).

Measures

Independent variable

Maternal schooling: is defined as years of formal schooling in the mother (self reported) with a range of 0 to 6 years of education. The mean is 1.34 with a standard deviation of 1.39. Maternal schooling is referred to as Maeduc in all tables and is coded as Maeduc1 for mothers with 1-3 years of education and Maeduc2 for mothers with 4-6 years of education.

Data on maternal schooling was collected during the census interviews and the mother herself was usually the informant.

Dependent variables

(1) Respiratory illness: defined as a proportion of the number of days ill to number of days at risk (in the village). Respiratory illness variables were calculated for each year from 0-48 months.

Respiratory illness information was collected through retrospective interviews every two weeks for the duration of the study in the home by trained interviewers. Respiratory illness variables are referred to as resp1yr, resp2yr, resp3yr and resp4yr in table 1.

(2) *Cognitive development tests:* A Preschool Battery, which consisted of 10 tests, was administered annually to all children aged 36, 48, 60, 72 and 84 months. Twelve additional tests were administered annually to all children at 60, 72 and 84 months (for detailed description of tests see Appendix A). The tests assessed a variety of skills such as verbal reasoning, learning, memory and perceptual analytical skills, and Piagetian concepts (e.g. conservation). Several of

these tests were adapted from preexisting standardized tests (e.g. the Stanford Binet, Wechsler Intelligence Scale for Children and the Wechsler Preschool and Primary Scale of Intelligence).

Test retest stability coefficients between tests (0.0 to 0.95) and within tests (e.g. 0.09 to 0.81) were obtained. Mean inter-observer reliability was 0.95 or above on all tests. Validity of the battery was established through correlations with village adults' judgments of brightness of particular children. Further, test performance was associated with age of entry into school and with school achievement (Gorman & Pollitt, 1993). Testing occurred within 1 month of the child's birthday and testing took place in adobe huts, which were centrally located in the villages. Tests were administered by trained Guatemalan school teachers (Pollitt et al, 1993).

Intervening Variable:

Mother's Literacy

A test of mother's literacy scored from 1 to 4, with 4 being literate (Engle, 1987). The maternal literacy measure correlated highly with years of maternal schooling (r=0.41), grades passed by mother (r=0.51) and mother's vocabulary score (r=0.33) (Engle, 1987). Mother's literacy variable is referred to as Malit in all tables.

Covariate

(1) House Quality: a rating based on type of construction, interior design, and condition of dwelling, was used as a measure of wealth of each household. This factor score had a test-retest reliability of 0.65, and was conceived of as one of the measures of socioeconomic status. House Quality is represented as House in all tables.

RESULTS

General Linear model regression analyses (proc GLM, SAS) was used in all analyses. In all analyses the dependent variables were regressed on the two categories of mother's education and maternal literacy while controlling for the wealth status of the household. Of the total of 22 tests in the preschool battery administered at 36, 48, 60, 72 and 84 months, only those tests with significant results ($P < 0.05$) are presented in table 2.

Results in table 1 clearly indicate an inverse relationship between mothers' education and incidence of respiratory illness in her offspring after controlling for the wealth status of the family. Further, mothers with 4-6 years of education had children with lower incidence of respiratory illness when compared to mothers with 1-3 years of education. Maternal literacy significantly mediated the relationship between maternal education and respiratory illness in the fourth year. Children from wealthier families had lower incidence of respiratory illness in all the years examined.

Results in table 2 indicate a similar pattern of results. Mothers with 4-6 years of education had children who performed significantly better than children of mothers with 1-3 years of education at 3, 5, 6 and 7 years of age. Further maternal literacy significantly mediated the relationship between maternal education and some cognitive outcomes at 5 and 6 years of age.

Table 1

Regressing the Incidence of Respiratory Illness on Mother's Education (defined categorically), Socioeconomic Status, and Mother's Literacy

	Maeduc 1	Maeduc 2	House	Malit	R^2
RESP1YR	- 0.047	- 0.127 ^	- 0.041 *	- 0.005	0.06
RESP2YR	- 0.047	- 0.070 ^	- 0.035 ^	- 0.005	0.04
RESP3YR	- 0.062	- 0.172 *	- 0.048 *	- 0.012	0.08
RESP4YR	- 0.009	- 0.107	- 0.045 *	- 0.037 *	0.08

* $p < 0.05$ ^ $p < 0.10$

Table 2

Regressing Cognitive Outcomes on Mother's Education (expressed as a categorical variable), Socioeconomic Status and Mother's Literacy.

Age	Tests	Maeduc 1	Maeduc2	Ses	Malit	R^2
36 m	Knoxf36	0.374	0.906*	-0.088	-0.106	0.11
48 m	Digit48	-1.612	6.442^	-0.953	1.450	0.06
	Knoxs48	0.531	0.345	0.181	0.042	0.04
60 m	Area60	-0.327*	0.591^	0.011	0.082	0.12
	Comvar60	-9.801^	13.809	-2.474	6.510*	0.10
	Digit60	2.397	10.899^	-1.797	1.471	0.09
	Discr60	4.28^	11.86*	2.03^	- 0.28	0.07
	Matter60	-0.049	0.757*	0.109^	0.033	0.11
	Mem60	-0.056	0.812	0.206	0.263	0.07
	Name60	0.526	0.564	-0.028	0.903*	0.08
	Recog60	0.240	0.122	0.145	1.072*	0.11
	Sent60	-1.888	6.280	-2.865	4.745*	0.09
72 m	Comp72	-3.727	23.646	4.728	5.458^	0.11
	Digit72	-1.421	23.798*	-0.285	0.522	0.10
	Emb72	0.344	2.755	-0.049	0.242	0.08
	Knoxf72	-0.275	2.659^	0.652	0.485	0.13
	Match72	-0.371	1.109	0.015	0.346*	0.10
	Memdes72	-2.858	17.628	2.037	3.811^	0.13
	Odd72	-0.210	2.901^	-0.225	0.361	0.10
	Recog 72	1.297^	4.511*	0.308	0.165	0.12
84 m	Comvar84	2.097*	5.727*	-0.542	-3.589	0.16
	Discr84	-6.129^	-23.891*	-1.218	1.176	0.10

* $p < 0.05$ ^ $p < 0.10$

DISCUSSION

The results presented in tables 1 & 2 add to the growing empirical evidence of the strong positive association between maternal education and child outcomes in developing countries. Further, the benefits of education were noted in those mothers who had attained a minimum of four years of formal education. Maternal literacy was found to mediate the relationship between maternal education and respiratory illness at 4 years of age and maternal education and cognitive outcomes in offspring at 5 and six years of age.

In a related study of the same population, it was observed that three to four years of formal education were necessary to acquire and maintain literacy skills (Gorman & Pollitt, 1994). It may well be that in this population, the more educated mothers who are also literate have acquired specific skills (e.g., numeracy, literacy) which allow them to be more effective parents. Ongoing research will help to clarify the pathways by which mother's education leads to more effective parenting and more optimal outcomes in children.

The data support an argument for investment in basic primary education for females in lower income countries. Policy makers should focus on increasing access to schools reducing attrition and targeting the most needy populations.

REFERENCES

Behrman, J. R. & Wolfe, B. L. (1987). How does mother's schooling affect family health, medical care usage and household sanitation? Journal of Econometrics, 36, 185-204.

Cochrane, S., O' Hara, D. & Leslie, J. (1982). Parental education and child health: intra-country evidence. Health, Policy & Education, 2, 213-250.

Engle, P. (1987). Environmental correlates of mental development in rural Guatemala. (Unpublished Manuscript).

Jejeebhoy, S. J. (1995). Women's education, autonomy, and reproductive behavior: experience from developing countries. Clarendon Press: Oxford.

Gorman, K.S. & Pollitt, E.P. (1994). The Contribution of schooling to literacy in Guatemala. Unpublished manuscript.

LeVine, R. A., LeVine, S. E., Richman, A., Tapia Uribe, F. M. & Sunderland Correa, C. (1991). Women's schooling and child care in demographic transition: a Mexican case study. Population and development Review, 3, (17).

Pollitt, E.P., Gorman, K. S., Engle, P., Martorell, R., & Rivera, J. (1993). Supplementary feeding and cognition: effects over two decades. Monographs of the Society for Research in Child Development, 58(7, Serial No. 235).

Streatfield, K., Singarimbun, M., & Diamond, I. (1990). Maternal education and child immunization. Demography, 27, (3), 447-445.